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EMBRYOLOGY.

Notes on the Development of Engystoma.—This interesting Batrachian occurs in the Piedmont section of North Carolina, near Littleton, and within twelve miles of the southern boundary of Virginia. Its presence after a rain may be discovered by its peculiarly plaintive note. Oviposition seems to occur in the evening and during cloudy afternoons. It is now late in July, yet two lots of ova have been found by me which had been very recently deposited by the parent female "frog-toad," as it is known here amongst the natives. The eggs are heavily pigmented at the upper or animal pole, being darker than the eggs of Rana, and also considerably smaller. They are laid in strings, but so coiled as to form a nearly complete single layer over a considerable surface of water. The gelatinous coating, as in Rana, spreads out under the surface of the water, where by its adhesion to the layer of molecules at the surface a certain amount of support is thus gained for the eggs. It is therefore evident that surface tension is an important agent in keeping the eggs of this genus, and those of Rana, at the surface of the water. Other genera, such as Bufo, do not have the eggs supported on the surface, but are laid in strings formed of one row of eggs, wrapped in a gelatinous cord which lies on the bottom of the pond in which oviposition occurs. Still other forms have the eggs glued together in large masses and supported upon water weeds; this is notably the case with some Urodeles, such as Amblystoma.

The development of the eggs of Engystoma is rapid; three days after deposit the larvæ escape from the egg-envelopes. Throughout the course of development there is well-marked evidence of geotropism, or of the action of gravity in maintaining the equilibrium of the egg. The animal or black pole remains uppermost, the heavier or light-colored vegetative pole remains lowermost; the whole egg is thus maintained in a position of static equilibrium with the earth's center. There seems to be no tendency to rotate the egg through ciliary action, previous to the closure of the medullary folds. That cilia are entirely absent on the eggs of Engystoma is proved by the fact that at the time the medullary groove is still open every egg of the same age is in exactly the same position in respect to the center of the earth, and remains so for a long time, or until the tail fold is well developed and the medullary groove has been closed. Before the closure of the medullary groove, but after the egg has begun to elongate and the paired, secretory, adhesive surfaces of the under side of the head have appeared as rudiments, the position of the animal and vegetative poles is still the same as in the undeveloped ovum. The head end of the egg is slightly elevated above the caudal end. This is due to the forward growth of the head, and the retention of the heavier yolk, farther backward under the posterior half of the medullary groove. The medullary groove thus comes to be inclined downward a few degrees from the head toward the tail, but the groove looks exactly toward the zenith, while the yolk looks downward in every egg, even the inclination of the medullary groove with respect to the horizon being the same for every egg of the same age.

At this stage I neglected to note an extremely important fact,—viz., whether the cephalic and caudal poles of the same row of eggs were all of them lying in the same direction. The fact that no change of position occurs for a long time in the eggs of Engystoma would indicate that possibly we might find that the future cephalic pole of the egg bore a constant relation to the cephalic pole of the parent Engystoma, such as is known to be the case in *Batrachus tau*. Such relations between parent and offspring exist to a marked degree, if they are not universal, in plants, and it is desirable to know to what extent the same rule holds with respect to animals. According to what has preceded, the early development of Engystoma is peculiarly favorable for the purpose of testing the theory that the cephalic and caudal polarities of the parent are transmitted directly to the offspring, or that the future long axis of the embryo already conforms, even in the egg, to that of the parent.

The next step in the development of Engystoma is somewhat similar to that of Rana. As soon as the larvæ have the tail-fold well developed they turn over and lie on the side, curved upon themselves, within the egg-envelope. This is the condition of the eggs on the second and early part of the third day. On the third day the larvæ leave the egg, and then tend to fall upon the bottom of the pool or receptacle in which hatching occurs. Soon after this they begin to swim about actively, and, singularly enough, instead of swimming like a fish, for some reason, which it is difficult to make out, the larvæ revolve on their own long axes. This singular mode of locomotion is probably due to the peculiar manner in which the tail is vibrated. This mode of swimming lasts about a day, after which the larvæ begin to swim in the usual fish-like way. At this stage, when the larvæ come to the surface, the head is in contact with the surface of the water, and when quiescent the axis of the body, when in a condition of equilibrium, assumes an angle of about eighty degrees with the surface. The adhesive organs near the mouth now become functional. Up to this time the light area on the yolk is prominent, and enables one to watch the singular rotation of the larvæ. The head now begins to widen rapidly, and the light area on the belly becomes darker. The tail-fold soon becomes very thin, and bordered all round by a delicate edging of black pigment. The larvæ cease to rotate on the fourth day, and no longer take up their angular position at the surface of the water, and now behave very much like the larvæ of Rana. They are now very heavily pigmented over the whole of the body; the light area over the space where the yolk was formerly placed has disappeared, and the larvæ are now black as seen from above.—J. A. RYDER.

ARCHEOLOGY AND ETHNOLOGY.[1]

The International Congress of Anthropology and Prehistoric Archeology of Paris. (*Continued from page 768.*)

Seventh Question: "Ethnographic Survivals Which Can Throw Light Upon the Social State of the Primitive Population of Central or Western Europe."

M. Hassler, of l'Assomption, opened the discussion of this question with a general presentation of the subject.

M. Lumholtz, of Christiania, Norway, gave a long and interesting description of his four years' residence in Australia.

M. Glaumont, of Bourail, presented the result of his studies of the usages, customs, and manners of the neo-Caledonians. M. Glaumont presented a series of fetiches which were used by the people.

Signor Belucci, of Perugia, presented a catalogue of his grand collection of amulets displayed at the exposition.

Dr. Hamy recalled a discussion which had taken place at the Society of Anthropology upon the subject of the savages of Mariannais, whom it was sought to prove were men living in ignorance of the use of fire; but Dr. Hamy presented a large fragment of pottery which had very evidently been made by fire and subjected to its use in cooking or otherwise.

M. Chily Naranjo, from the Canary Islands, recalled the conclusions which had been presented to the congress of 1878 by M. Verneau

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[1] Edited by Dr. Thomas Wilson, Smithsonian Institution.